What is claimed is:

1. A semiconductor device, wherein an interlayer dielectric film having Si-H bonds is provided on a base layer including a semiconductor substrate and a silicon carbon nitride film is formed on said interlayer dielectric film.

2. The semiconductor device according to claim 1, wherein an electrically conductive film containing Cu as a main component element is embedded in a trench formed in said interlayer dielectric film and the silicon carbon nitride film is formed on said electrically conductive film.

3. The semiconductor device according to claim 2, wherein said interlayer dielectric film and said electrically conductive film are each formed in a plurality of layers and said silicon carbon nitride film is formed so as to cover said electrically conductive film and said interlayer dielectric film each in a top layer.

4. The semiconductor device according to claim 1, wherein said silicon carbon nitride film has a nitrogen concentration of not less than 10 atm % but less than 35 atm %.

5. The semiconductor device according to claim 2, wherein said silicon carbon nitride film has a nitrogen concentration of not less than 10 atm % but less than 35 atm %.

6. The semiconductor device according to claim 1, wherein said silicon carbon nitride film has a nitrogen concentration of not less than 15 atm % but not more than 30 atm %.

7. The semiconductor device according to claim 2, wherein said silicon carbon nitride film has a nitrogen concentration of not less than 15 atm % but not more than 30 atm %.

8. The semiconductor device according to claim 6, wherein said silicon carbon nitride film contains not less than 22 atm % but not more than 27 atm % Si, not less than 20 atm % but not more than 25 atm % C, and not less than 35 atm % but not more than 45 atm % H.

9. The semiconductor device according to claim 7, wherein said silicon carbon nitride film contains not less than 22 atm % but not more than 27 atm % Si, not less than 20 atm % but not more than 25 atm % C, and not less than 35 atm % but not more than 45 atm % H.

10. The semiconductor device according to claim 4, wherein said silicon carbon nitride film further contains not less than 0.5 atm % but less than 5 atm % O.

11. The semiconductor device according to claim 5, wherein said silicon carbon nitride film further contains not less than 0.5 atm % but less than 5 atm % O.

12. The semiconductor device according to claim 1, wherein said interlayer dielectric film having Si-H bonds is a ladder-type hydrogenated polysiloxane film or a porous ladder-type hydrogenated polysiloxane film.

13. The semiconductor device according to claim 2, wherein said interlayer dielectric film having Si-H bonds is a ladder-type hydrogenated polysiloxane film or a porous ladder-type hydrogenated polysiloxane film.

14. The semiconductor device according to claim 2, wherein a metal nitride film is provided between said interlayer dielectric film and said electrically conductive film containing said Cu as a main component element and a metal film is provided between said electrically conductive film containing said Cu as a main component element and said metal nitride film.

15. The semiconductor device according to claim 2, wherein said electrically conductive film containing Cu as a main component element is a Cu alloy film containing at least one kind selected from the group consisting of Al, Si, Ag, W, Mg, Bi, Zn, Pd, Cd, Au, Hg, Be, Pt, Zr, Ti and Sn.

16. The semiconductor device according to claim 2, wherein said electrically conductive film containing Cu as a main component element is a Cu alloy film containing Si and the Si content is highest on a top surface of the electrically conductive film

and gradually decreases with increasing depth in the direction of a bottom surface.

17. A fabricating method of a semiconductor device, comprising:

a first step of forming an interlayer dielectric film having Si-H bonds on a semiconductor substrate;

a second step of forming a trench in said interlayer dielectric film;

a third step of forming a barrier metal film on a side wall and bottom surface of said trench;

a fourth step of embedding an electrically conductive film containing Cu as a main component element in a trench in which said barrier metal film is formed; and

a fifth step of forming a silicon carbon nitride film on said interlayer dielectric film and said electrically conductive film.

18. The fabricating method of a semiconductor device according to claim 17, wherein said third step involves forming a barrier metal film which is formed by sequentially laminating a metal nitride film and a metal film on a side wall and bottom surface of said trench.

19. The fabricating method of a semiconductor device according to claim 17, wherein said electrically conductive film containing Cu as a main component element is a Si-containing film in which a Cu film is subjected to silane treatment.

20. A semiconductor device, wherein an interlayer dielectric film having Si-H bonds and an electrically conductive film containing Cu as a main component element are provided on a base layer including a semiconductor substrate, a metal nitride film is provided between said interlayer dielectric film and said electrically conductive film containing Cu as a main component element, and a metal film is provided between said electrically conductive film containing Cu as a main component element and said metal nitride film.

21. The semiconductor device according to claim 20, wherein said electrically conductive film containing Cu as a main component element is buried in a trench formed in said interlayer dielectric film.

22. The semiconductor device according to claim 20, wherein said metal film is Ta and said metal nitride film is TaN.

23. The semiconductor device according to claim 22, wherein said TaN has a nitrogen content of not less than 15 atm %.

24. The semiconductor device according to claim 22, wherein said TaN has a nitrogen content of not less than 15 atm % but less than 40 atm %.

25. The semiconductor device according to claim 20, wherein said interlayer dielectric film having Si-H bonds is either a

hydrogenated polysiloxane film or a hydrogenated organopolysiloxane film.

26. The semiconductor device according to claim 25, wherein said hydrogenated polysiloxane film is a ladder-type hydrogenated polysiloxane film or a porous ladder-type hydrogenated polysiloxane film.

27. The semiconductor device according to claim 20, wherein said electrically conductive film containing Cu as a main component element is a Cu alloy film containing at least one kind selected from the group consisting of Al, Si, Ag, W, Mg, Bi, Zn, Pd, Cd, Au, Hg, Be, Pt, Zr, Ti and Sn.

28. The semiconductor device according to claim 20, wherein said electrically conductive film containing Cu as a main component element is a Cu alloy film containing Si and the Si content is highest on a top surface of the electrically conductive film and gradually decreases with increasing depth in the direction of a bottom surface.

29. A fabricating method of a semiconductor device, comprising:

a first step of forming an interlayer dielectric film having Si-H bonds on a semiconductor substrate;

a second step of forming a trench in said interlayer dielectric film;

a third step of forming a barrier metal film which is formed by sequentially laminating a metal nitride film and a metal film on a side wall and bottom surface of said trench; and

a fourth step of embedding an electrically conductive film containing Cu as a main component element in a trench in which said barrier metal film is formed.

30. The fabricating method of a semiconductor device according to claim 29, wherein said electrically conductive film containing Cu as a main component element is an Si-containing film in which a Cu film is subjected to silane treatment.

31. The fabricating method of a semiconductor device according to claim 29, wherein said first step is a step in which after the formation of an interlayer dielectric film containing Si as a main component element, hydrogen is caused to diffuse to said interlayer dielectric film thereby to form the Si-H bond.

32. The fabricating method of a semiconductor device according to claim 31, wherein said diffusion treatment of hydrogen is any of plasma treatment, electron beam treatment, radical treatment and ion implantation treatment.